

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appellant:	Lifeng ZHANG	)	
		)	Group Art Unit: 1623
Serial No.:	10/677,436	)	
		)	
Filed:	October 2, 2003	)	Examiner: Leigh C. MAIER
		)	
For:	METHOD FOR IMPROVING VISCOSITY	)	Conf. No.: 9011
	OF THICKENERS FOR AQUEOUS SYSTEMS	)	

**VIA EFS-WEB**

Assistant Commissioner for Patents  
P.O. Box 1450  
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**CORRECTED APPEAL BRIEF**

## **I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is The Dow Chemical Company.

## **II. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

## **III. STATUS OF THE CLAIMS**

Claims 1, 4, 6-9, 10, 12, 13, 16-24, 29 and 30 are pending in the application.

Claims 4 and 6-9 have been withdrawn from consideration.

Claims 10, 12, 13, and 16-24 have been allowed.

Claims 1, 29 and 30 stand finally rejected.

Claims 1, 29 and 30, as they currently stand, are set forth in Section VIII, the Claims Appendix. Appellants hereby appeal the final rejection of Claims 1, 29 and 30.

## **IV. STATUS OF THE AMENDMENTS**

Subsequent to the final rejection dated August 18, 2009, Appellants submitted a Response dated November 18, 2009, which included amendments to claims 16 and 17, and introduced new claim 30. The Amendment filed November 18, 2009 and all prior amendments have been entered.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

Claims 1, 29 and 30 are directed to compositions for a reduced viscosity hydrophobic thickener system for thickening a polymer-containing aqueous system (p. 2, ll. 11-12), wherein the compositions comprise (a) a cyclodextrin or cyclodextrin-containing compound (p. 2, ll. 11-13) and (b) a hydrophobically modified polyethoxylated urethane thickener (p. 2, ll. 11-14 and p. 6, ll. 15-18) comprising at least one terminal phobe of a size capable of complexing with the hydrophobic cavity of the cyclodextrin or cyclodextrin-containing compound (p. 6, ll. 15-20 ) and

at least one urethane linkage formed from one or more diisocyanates (p. 6, ll. 15-21), and wherein at least a portion of the cyclodextrin or cyclodextrin-containing compound is complexed with the hydrophobically modified thickener in such a way that at least a portion of at least one of the phobes at least partially fills the hydrophobic cavity (p. 6, ll. 15-22 ).

In independent claim 1, the cyclodextrin is methyl- $\alpha$ -cyclodextrin (p. 4, ¶ 2) and the diisocyanate comprises 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, 1,4-cyclohexylene diisocyanate, 1-isocyanato-3-isocyanatomethyl-3,5,5-trimethylcyclohexane, 2,6- and 2,4-tolylene diisocyanate, m-phenylene diisocyanate, p-phenylene diisocyanate, xylene diisocyanate, 4-chloro-1,3-phenylene diisocyanate, 4,4'-biphenylene diisocyanate, 4,4'-methylene diphenylisocyanate, 1,5-naphthylene diisocyanate, 1,5-tetrahydronaphthylene diisocyanate, or a combination comprising at least one of the foregoing diisocyanates (p. 7, ll. 8-16).

In independent claim 29, the composition comprises a cyclodextrin-containing compound and the diisocyanate comprises 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, or a combination comprising at least one of the foregoing diisocyanates (p. 7, ll. 8-16).

Claim 30, which depends from claim 29, recites the composition of claim 29 in which the diisocyanate is 1,6-hexamethylene diisocyanate (p. 7, ll. 8-16).

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 29 and 30 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart *et al.*, U.S. Patent No. 5,137,571 (hereafter “Eisenhart”) in view of Emmons *et al.*, U.S. Patent No. 4,079,028 (hereafter “Emmons”).

Claim 1 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart *et al.*, U.S. Patent No. 5,137,571 (hereafter “Eisenhart”) in view of Emmons *et al.*, U.S. Patent No. 4,079,028 (hereafter “Emmons”) and further in view of Lau *et al.*, U.S. Patent No. 5,376,709 (hereafter “Lau ‘709”) and Lau *et al.*, U.S. Patent No. 5,521,266 (hereafter “Lau ‘266”).

Claim 29 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of Harris *et al.*, U.S. Patent No. 7,125,919 (hereafter “Harris”) in view of Emmons.

Claim 29 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 3 of Tanzer *et al.*, U.S. Patent No. 6,887,928 (hereafter “Tanzer”) in view of Emmons.

Claim 29 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of Lau ‘709 in view of Emmons.

Claim 29 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 2 of Eisenhart in view of Emmons.

Claim 1 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claim 2 of Eisenhart in view of Emmons, and further in view of Lau ‘709 and Lau ‘266.

## VII. ARGUMENT

### A. Claims 29 and 30 satisfy the requirements of 35 U.S.C. § 103(a).

Claims 29 and 30 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart *et al.*, U.S. Patent No. 5,137,571 (“Eisenhart”) in view of Emmons *et al.*, U.S. Patent No. 4,079,028 (“Emmons”). More specifically, the Examiner is of the view that Eisenhart teaches the use of cyclodextrins in combination with hydrophobically modified polyethoxylated urethane thickeners, including those thickeners disclosed by Emmons. The Examiner notes that Eisenhart does not exemplify the range of diisocyanates presently claimed, but believes that Emmons provides such a teaching (Office Action dated January 6, 2009 at page 3 and Office Action dated August 18, 2009 at page 3). Accordingly, the Examiner is of the view that it would have been obvious to modify the composition of Eisenhart by selecting one of the diisocyanates provided by Emmons for combination with a cyclodextrin.

1. The Examiner has not established a *prima facie* case of obviousness.

Section 103(a) states:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that **the subject matter as a whole would have been obvious** at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. ...

(Emphasis added.)

The determination of obviousness requires an analysis of the scope and content of the prior art, as well as the differences between the prior art and the claims at issue. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17, 86 S. Ct. 684, 15 L.Ed.2d 545 (1966). The prior art is analyzed to determine the presence or absence of each limitation of the claim, and to determine whether the art provides a motivation to combine the limitations as recited in the claim. As the Supreme Court recently noted “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the art.... This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR Int’l. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* The Court further stated that “[r]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Moreover, as stated in MPEP 2141.02 VI, a prior art reference must be considered in its entirety, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 154 (Fed. Cir. 1983) *cert. denied*, 469 U.S. 851 (1984). An invention is nonobvious if “the prior art teaches away from the claimed invention.” *In re Geisler*, 116 F.3d 1465, 1471 (Fed. Cir. 1997); *KSR*, 127 S. Ct. at 1740 (“when the prior art teaches away from combining certain known elements, discovery of a successful means of

combining them is more likely to be nonobvious”). Accordingly, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983).

The Examiner has failed to establish *prima facie* obviousness, because the prior art does not provide a motivation to generate the combinations of limitations recited in the present claims 29 and 30 and, in fact, teaches away from the claimed invention. The present claims are directed to compositions that comprise a cyclodextrin compound and a hydrophobically modified polyethoxylated urethane thickener selected from the list provided. As discussed in more detail below, neither Eisenhart nor Emmons, individually or in combination, disclose or suggest such a combination of limitations.

Eisenhart generally discloses the reversible complexation of cyclodextrin compounds with the hydrophobic moieties of hydrophobic thickeners in the absence of organic solvents to suppress the viscosity of aqueous solutions of the thickener. The resulting complexes are decomplexed to permit the thickener to perform its intended function (Abstract). Hydrophobically modified polyurethanes, alkali soluble emulsions, hydroxyethyl cellulose, and polyacrylamides are discussed (col. 1, ll. 28-34), and  $\alpha$ -,  $\beta$ -, and  $\gamma$ -cyclodextrins, and their hydroxyethyl and hydroxypropyl derivatives are described (col. 3, ll. 50-63).

Emmons generally discloses urethane thickeners having at least three low molecular weight hydrophobic groups, at least two of which are terminal (external) hydrophobic groups (col. 2, ll. 44-47). The polymers can be solubilized in water by use of a water miscible alcohol or surfactant (col. 2, ll. 48-57). Suitable diisocyanate starting materials for the polyurethanes are listed in col. 8, l. 55 to col. 9, l. 16. No mention is made of cyclodextrins of any kind.

Nowhere in Eisenhart is there any teaching or suggestion to use the modified polyethoxylated urethane thickeners taught by Emmons. Eisenhart's only mention of Emmons occurs in the in the “Description of the Prior Art” section of the specification, stating that “U.S. Pat. Nos. 4,155,892 and 4,079,028 [Emmons] are directed to polyurethane thickeners, characterized by at least three hydrophobic groups interconnected by hydrophilic polyether groups, formulated with organic solvents” (col. 1, ll. 59-62; emphasis added). The context of this reference clearly indicates that Emmons is considered prior art, an earlier invention that suffers from disadvantages remedied by the invention of Eisenhart. Eisenhart makes no attempt to

reference the disclosure of Emmons so as to suggest incorporating elements of Emmons into the Eisenhart compositions. No reference to Emmons can be found in the “Summary of the Invention” or the “Detailed Description of the Invention” sections of Eisenhart, and Emmons is not incorporated by reference. Accordingly, Eisenhart provides no motivation to combine these references. The Examiner has not suggested any other motivation for combining the references, and none can be found in Emmons, which is silent on the use of cyclodextrins in combination with urethane associative thickeners. Appellants believe that a person of ordinary skill in the art, without the benefit of hindsight, would not have been motivated to incorporate the diisocyanates of Emmons into the compositions of Eisenhart.

Further, Eisenhart’s specific and exclusive disclosure of 4,4’-methylene-bis(isocyanatocyclohexane) to the exclusion of all the other diisocyanates disclosed in Emmons *teaches away* from the straight chain and branched chain diisocyanates of claim 29. There is no teaching or suggestion that any urethane thickener other than one based on 4,4’-methylene-bis(isocyanatocyclohexane) can be used. Urethane thickeners based on this diisocyanate are taught in Example 1 (10 samples), Example 2 (4 samples), Example 3 (5 samples), Example 4 (24 samples), Example 5 (5 samples), and Example 6 (18 samples). Example 7 teaches hydrophobically modified alkali soluble emulsion thickeners, a hydrophobically modified hydroxyethyl cellulose thickener, and an unmodified hydroxyethyl cellulose thickener, not a urethane thickener of any kind. There is no teaching or suggestion of a urethane thickener derived from a straight chain or branched chain diisocyanate. Appellant submits that Eisenhart’s exclusive, and extensive, teaching of urethane thickeners based on 4,4’-methylene-bis(isocyanatocyclohexane), a *cyclic* diisocyanate, in 66 compositions set forth in six examples, can be fairly and reasonably construed as teaching away from urethane thickeners based on straight chain or branched chain (*acyclic*) diisocyanates.

As mentioned above, Emmons is relied on by the Examiner for the disclosure of a list of possible diisocyanate precursors to hydrophobically modified urethane thickeners. However, no reason or motivation is provided in Eisenhart or Emmons to combine the two references; and, if such a combination were made, there is would have been no reason or motivation to select only the recited straight chain and branched chain diisocyanates (1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, and 2,2,4-trimethyl-1,6-

diisocyanatohexane) from the extensive list disclosed by Emmons. Of the 281 examples of hydrophobically modified urethane thickeners in Emmons, the vast majority are derived from 2,4-tolylene diisocyanate, 2,6-tolylene diisocyanate, methylene bis(4-cyclohexylisocyanate), and diphenylmethane-4,4'-diisocyanate. These diisocyanates are all cyclic or polycyclic, not straight chain or branched chain. Considering the disclosure of Emmons in its entirety, no motivation is provided to select straight chain and branched chain diisocyanates for urethane thickeners to the exclusion of all others. The Examiner has not demonstrated any motivation for selecting specifically and exclusively urethane thickeners based on straight chain and branched chain diisocyanates from the list of at least twenty diisocyanates in col. 8, l. 55 to col. 9, l. 15 of Emmons.

Accordingly, a person of ordinary skill in the art would not have been motivated to combine the cited references so as to result in the compositions of claims 29 and 30. In the absence of art that provides motivation to combine the two limitations into a single invention, there is no *prima facie* case of obviousness.

2. Appellant has provided evidence of unexpected results sufficient to rebut *prima facie* obviousness.

In the absence of *prima facie* obviousness, an applicant is not required to provide evidence of secondary considerations, such as unexpected results. Appellant has, however, provided such evidence. An applicant can rebut a *prima facie* obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties. *In re Dillon*, 919 F.2d 688, 692-93 (Fed. Cir. 1990). Accordingly, even if a *prima facie* case were established, the present claims should have been found to be nonobvious in view of the experimental results provided in the present application and further discussed in Appellant's Amendment dated August 18, 2009. These studies unequivocally demonstrate that compositions of the present invention, as recited in claims 29 and 30, exhibit unexpected beneficial properties, which are sufficient to rebut a *prima facie* case of obviousness.

The experimental results provided in the present application compare the ability of cyclodextrins to suppress the viscosity of aqueous solutions that comprise different urethane thickeners. Unexpectedly, the viscosity of solutions comprising urethane thickeners derived from



straight chain and branched chain diisocyanates was suppressed to a greater extent than the viscosity of solutions comprising urethane thickeners derived from cyclic or polycyclic diisocyanates. The consistent result of all of Examples 1-19 in the present application is that the viscosity of aqueous solutions of urethane thickeners derived from 1,6-hexamethylene diisocyanate (HDI), which is a straight chain diisocyanate, is suppressed more than the viscosity of aqueous solutions of urethane thickeners derived from (4,4'-methylene bis(isocyanatohexane, or Des W), which is a cyclic diisocyanate, when they are combined with methyl- $\alpha$ -cyclodextrin or methyl- $\beta$ -cyclodextrin. Comparative data can be found in Tables 1-4 on pp. 10-13 of the present application. In order to emphasize these results, Tables 1-4 presenting test data are reproduced below.

TABLE 1

METHYL- $\beta$ -CD WT%	THICKENER NORMALIZED VISCOSITY				THICKENER % SOLIDS
	HEUR1 w/ DES W (Ex 1)	HEUR2 w/ DES W (Ex 2)	HEUR3 w/ HDI (Ex 3)	HEUR4 w/ HDI (Ex 4)	
0 (comparative)	1	1	1	1	20
0.5	0.927	0.967	0.27	0.328	20
1	0.785	0.887	0.141	0.153	20
1.5	0.565	0.748	0.084	0.092	20
2	0.377	0.49	0.046	0.062	20
2.5	0.209	0.278	0.032	0.043	20
3	0.123	0.159	0.018	0.025	20
3.5	0.089	0.096	0.014	0.02	20

With respect to Table 1, note that for every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the normalized viscosity of the Des W thickener lower than the normalized viscosity of the HDI thickener.

TABLE 2

METHYL- $\beta$ -CD WT%	THICKENER VISCOSITY (cps)					
	HEUR5 w/ DES W at 20% Solids (Ex 5)	HEUR3 w/ HDI at 20% Solids (Ex 6)	HEUR6 w/ DES W at 20% Solids (Ex 7)	HEUR7 w/ HDI at 20% Solids (Ex 8)	HEUR6 w/ DES W at 18% Solids (Ex 9)	HEUR7 w/ HDI at 18% Solids (Ex 10)
0 (comparative)	22700	44400	17200	21250	11000	14700
0.45					11300	6900
0.5	22600	12000	17800	9800		
1	18450	6250	14400	5850	10100	4050
1.35					7800	2850
1.5	14200	3750	11500	4200		
1.8					5250	
2	8900	2050	7750			
2.25					3700	
2.5	5300	1400	5250			
2.7					2300	
3	3500	800	3150			
3.5	1650	600				

With respect to Table 2, the same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W thickener lower than the viscosity of the HDI thickener.

TABLE 3

METHYL- $\beta$ -CD WT%	THICKENER VISCOSITY (cps)		PrOH- $\beta$ -CD WT%	THICKENER VISCOSITY (cps)	
	HEUR8 w/ DES W at 18% Solids (Ex 11)	HEUR9 w/ HDI at 18% Solids (Ex 12)		HEUR8 w/ DES W at 18% Solids (Ex 13)	HEUR9 w/ HDI at 18% Solids (Ex 14)
0.5		20800	0.5		
1		9400	1		45700
1.5		5600	1.5		31300
2	17300	3500	2		21100
2.5	11100	2200	2.5	37400	17000
3	6650	1500	3	22600	13800
3.5	3100		3.5	11200	
4	2500		4	8400	
4.5	1200		4.5	2050	

With respect to Table 3, again, the very same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W

thickener lower than the viscosity of the HDI thickener. Moreover, the same result is observed for both methyl- $\beta$ -cyclodextrin and hydroxypropyl- $\beta$ -cyclodextrin.

TABLE 4

METHYL- $\beta$ -CD WT%	THICKENER VISCOSITY (cps)		METHYL- $\alpha$ -CD WT%	THICKENER VISCOSITY (cps)	
	HEUR 10 w/ DES W at 20% Solids (Ex 15)	HEUR11 w/ HDI at 20% Solids (Ex 16)		HEUR10 w/ DES W at 20% Solids (Ex 17)	HEUR11 w/ HDI at 20% Solids (Ex 18)
1		14300	1		14100
2	17800	5400	2		3350
3	8350	2550	3	13300	1600
4	2500		4	2750	

With respect to Table 4, again, the very same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W thickener lower than the viscosity of the HDI thickener. Moreover, the same result is observed for methyl- $\alpha$ -cyclodextrin.

In response to Appellant's unequivocal demonstration of unexpected results, also presented in Appellant's Amendment of May 6, 2009, the Examiner states:

First of all, given that the viscosity modification depends on the interaction between the hydrophobic moieties of the thickener and the cyclodextrin, some variation is to be expected. It does not appear this difference seen in comparing two species are of statistical and practical significance. It could be that there are similar variations between various cyclic species or various non-cyclic species. Furthermore, the extrapolation of these supposed unexpected results using 1,6-hexamethylene diisocyanate to the other three recited diisocyanates and to all cyclodextrins appears to be rather arbitrary.

(Office Action of August 18, 2009, p. 4, second par.)

Appellant strongly disagrees with the Examiner's interpretation of the data. The fact that variation is expected in any experimental data does not in any way detract from unexpected and consistent nature of the results. In *each and every example* comparing the viscosity-suppressing effect of a cyclodextrin on a urethane thickener derived from 1,6-hexamethylenediisocyanate

(HDI) to one derived from 4,4'-methylene-bis(isocyanatocyclohexane), the viscosity reduction with the urethane thickener derived from HDI is always greater than the viscosity reduction with the urethane thickener derived from 4,4'-methylene-bis(isocyanatocyclohexane). It is significant that this comparative relationship consistently holds despite expected experimental variation, i.e., the viscosity suppression effect is consistently greater than any experimental variation.

The Examiner states that “[i]t does not appear that this difference seen in comparing two species are of statistical and practical significance”. Appellant respectfully disagrees. These results have tremendous practical, and therefore commercial, significance. The results mean that lower amounts of urethane thickeners can be used when they are based on straight chain or branched acyclic diisocyanates, which will lead to lower cost paint formulations, for example. Applicants also submit that the results are statistically significant. If the difference in viscosity suppression between the two types of urethane thickeners was not statistically significant, there would be a more or less equal number of results where viscosity suppression was greater with one urethane thickener and where viscosity suppression was greater with the other urethane thickener. The fact that the thickener based on HDI consistently shows greater viscosity suppression is strong evidence that the result is in fact statistically significant.

The Examiner also states, “the extrapolation of these supposed unexpected results using 1,6-hexamethylene diisocyanate to the other three recited diisocyanates and to all cyclodextrins appears to be rather arbitrary.” Again, Appellant respectfully disagrees. The selection of the other three recited diisocyanates was not arbitrary or random in any way, but based on a sound conclusion reached by careful review of the data of record. HDI is a *straight chain* diisocyanate exhibiting surprising and unexpected high viscosity suppression with cyclodextrins. Since the comparative data was obtained with a urethane thickener based on a *cyclic diisocyanate*, Appellant concluded that the aliphatic group of the diisocyanate determines the relative viscosity suppression effect of the cyclodextrin. Since higher viscosity suppression was obtained with a straight chain diisocyanate (HDI), than a cyclic diisocyanate (4,4'-methylene-bis(isocyanatocyclohexane)), it is a very reasonable conclusion that a straight chain (as opposed to a cyclic group) is the key structural feature responsible for the viscosity suppression effect. HDI has a six-carbon chain. 2,2,4-Trimethyl-1,6-diisocyanatohexane also has a six-carbon chain, but is branched with three methyl groups. It is entirely reasonable to extrapolate the results from

a straight six-carbon chain to a branched six-carbon chain. It is also reasonable to extrapolate the same viscosity effect to a carbon chain having two fewer carbon atoms (1,4-tetramethylene diisocyanate) and to a carbon chain having four more carbon atoms (1,10-decamethylene diisocyanate) than HDI. Appellant submits that it is very reasonable to extrapolate this surprising effect to such structurally similar homologs.

With respect to extrapolation of the unexpected results to other cyclodextrins, data is reproduced above showing that the same enhanced viscosity suppression effect is observed for hydroxypropyl- $\beta$ -cyclodextrin (different substituent, Table 3) and methyl- $\alpha$ -cyclodextrin (different ring size, Table 4) as well as methyl- $\beta$ -cyclodextrin in the other examples. Hydroxypropyl- $\beta$ -cyclodextrin is significantly more polar than its parent compound  $\beta$ -cyclodextrin, and methyl- $\beta$ -cyclodextrin and methyl- $\alpha$ -cyclodextrin have significantly different ring sizes and therefore internal cavities. Applicants submit that the observation of similar viscosity suppression results for these structurally different (both in size and polarity) cyclodextrins provides sufficient support to extrapolate this effect to all cyclodextrins.

The Examiner states, “[i]t could be that there are similar variations between various cyclic species or various non-cyclic species.” Appellant submits that with no supporting data, this statement is highly speculative. Even if it were true, it would not alter the conclusion reached by the Applicant based on the results of record, i.e. that viscosity suppression for urethane thickeners based on straight chain diisocyanates is greater than viscosity suppression for urethane thickeners based on cyclic diisocyanates.

For all of the foregoing reasons, Appellants submit that the Examiner erred in maintaining the rejection of claims 29 and 30 under 35 U.S.C. § 103(a), as unpatentable over Eisenhart in view of Emmons.

**B. Claim 1 satisfies the requirements of 35 U.S.C. § 103(a)**

Claim 1 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart in view of Emmons and further in view of Lau *et al.*, U.S. Patent No. 5,376,709 (“Lau ‘709”) and Lau *et al.*, U.S. Patent No. 5,521,266 (“Lau ‘266”).

The relevant section of 35 U.S.C. and case law, as well as the disclosures of Eisenhart and Emmons, are discussed above.

Lau '709 generally discloses an improved method for reversibly suppressing the viscosity of an aqueous solution containing a hydrophobically modified thickener by first complexing the thickener with methyl- $\beta$ -cyclodextrin and then decomplexing the thickener (Abstract). The thickener is decomplexed by the addition of a surface active agent (anionic, nonionic, and cationic surfactants) or by the addition of water soluble organic solvents (e.g., ethanol or Texanol<sup>®</sup> (col. 4, ll. 3-20)).

Lau '266 generally discloses an aqueous polymerization method comprising the steps of (1) complexing at least one monomer having low water solubility with a macromolecular organic compound having a hydrophobic cavity and (2) polymerizing in an aqueous system 0.1-100% of the complexed monomer with 0-99.9% of a monomer having high water solubility (Abstract). The macromolecular organic compound can be cyclodextrin or a cyclodextrin derivative. Suitable cyclodextrin derivatives are methyl, triacetyl, hydroxypropyl, and hydroxyethyl derivatives of  $\alpha$ -,  $\beta$ -, and  $\gamma$ -cyclodextrin. Methyl- $\beta$ -cyclodextrin is the preferred derivative (col. 3, ll. 51-62). Methyl- $\beta$ -cyclodextrin is used exclusively in the examples, and there is no mention of urethane thickeners.

1. The Examiner has not established *prima facie* obviousness.

The Examiner has failed to establish *prima facie* obviousness, because the prior art does not provide a motivation to generate the combination of limitations recited in the present claim 1 and, in fact, teaches away from the claimed invention. Claim 1 recites a composition that comprises methyl- $\alpha$ -cyclodextrin and a hydrophobically modified polyethoxylated urethane thickener selected from the list provided. None of the cited references, individually or in combination, disclose or suggest such a combination.

The Examiner states that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to select any of the hydrophobically modified polyethoxylated urethane thickeners taught by Emmons with a reasonable expectation of success as discussed above. Furthermore, Eisenhart teaches the use of unmodified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins, as well as generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl- $\beta$ -cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available

modified cyclodextrin, such as methyl- $\alpha$ -cyclodextrin, disclosed by Lau '266, with a reasonable expectation of success.

(Office Action Dated August 18, 2009, p 5, paragraph 5.)

The Appellant can find no reference to generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins anywhere in Eisenhart. Instead, Eisenhart specifically teaches modified cyclodextrins that are more water-soluble than the corresponding unmodified compounds. In particular, Eisenhart teaches hydroxyethyl- and hydroxypropyl-modified cyclodextrins, without specifying whether they are the  $\alpha$ -,  $\beta$ - or  $\gamma$ - forms (col. 3, ll. 50-63):

Applicants have found that not only can the alpha, beta and gamma cyclodextrins be used effectively as transient viscosity suppressing agents for hydrophobic associative thickeners, but that modified cyclodextrins, such as for example those cyclodextrins produced by the process described in UK Patent application 2,189,245 A, which are more soluble in water than the unmodified cyclodextrin compounds can also be employed in this manner. In fact applicants have found it preferable to utilize hydroxyethyl- or hydroxypropyl-cyclodextrins having a higher degree of water solubility than the unmodified cyclodextrins for use with aqueous solutions containing high concentrations of associative thickener.

(Emphasis added.)

Moreover, Eisenhart's teaching of water-soluble cyclodextrins *teaches away* from methyl cyclodextrins such as methyl- $\alpha$ -cyclodextrins. The skilled person in the art will know that methyl cyclodextrins are formed by replacement of polar hydroxyl groups of unmodified cyclodextrins with non-polar methyl ether groups, and will expect that this substitution will make the resulting methyl cyclodextrins considerably less polar, and therefore less water-soluble, than the unmodified cyclodextrins. Thus, Eisenhart's teaching of water-soluble cyclodextrins that are *more* water-soluble is a clear teaching *away* from methyl cyclodextrins. Since Eisenhart teaches away from methyl cyclodextrins, the use of methyl- $\alpha$ -cyclodextrin in the composition is *not* obvious.

The Examiner has dismissed this argument by stating that "methylated cyclodextrins are well known in the art to be quite soluble" (Advisory Action dated Dec. 1, 2009, page 2, second paragraph). Appellant believes that focusing on the absolute solubility of methylated cyclodextrins misses the point. Based on general chemical knowledge, Appellant was pointing out that a modification of cyclodextrin in which a polar hydroxyl group is replaced

with a non-polar methyl ether group will tend to decrease the solubility of the modified cyclodextrin relative to the unmodified cyclodextrin. Such a modification does not conform to Eisenhart's teaching of water-soluble cyclodextrins that have increased water solubility, as compared to the corresponding unmodified cyclodextrin.

Lau '266 teaches a polymerization method, not a composition for viscosity suppression of urethane thickeners. Lau '266 is silent on *polyurethane* thickeners, and offers no hint or suggestion that methyl- $\alpha$ -cyclodextrin is suitable for viscosity suppression of *urethane* thickeners. Lau '709 discloses polyurethane thickeners, but is silent on the chemical structure of the polyurethane thickeners disclosed therein.

In response, the Examiner states that:

It is noted that although the reference [Lau '266] teaches this polymerization method, it further teaches that the polymers so prepared can be used as associative thickeners and specifically citing Eisenhart: "This patent discloses a method of suppressing the viscosity of associative thickeners using cyclodextrins and cyclodextrin derivatives. After the solution copolymers of the present invention are formed, but before they are decomplexed from the cyclodextrin or cyclodextrin derivative, the solution copolymers may be added directly into a coating composition and decomplexed therein."

(Office Action of August 18, 2009, p. 6, first par.)

The polymers prepared in Lau '266 are solution copolymers formed from (meth)acrylate monomers. Thus they are (meth)acrylic copolymers, *not urethane thickeners*. The paragraph cited by the Examiner also has the statement, "[s]olution copolymers produced by the method of this invention which act as associative thickeners may beneficially [be] used as described in U.S. Patent No. 5,137,571" (col. 6, ll. 46-48). This statement is a teaching that the (meth)acrylic copolymers of Lau '266 may be used as associative thickeners. It is *not* a teaching or suggestion that *urethane thickeners* may be used with methyl- $\alpha$ -cyclodextrin. Moreover, as set forth above, Eisenhart teaches hydroxyethyl- and hydroxypropyl-substituted cyclodextrins, not methyl- $\alpha$ -cyclodextrin, so the reference to Eisenhart by Lau '266 cannot be construed as a teaching of the use of methyl- $\alpha$ -cyclodextrin.

Applicants submit that no motivation to replace the methyl- $\beta$ -cyclodextrin of Lau '709 with methyl- $\alpha$ -cyclodextrin can be found in either Lau '709 or Lau '266. As set forth above, Lau '266 teaches an aqueous polymerization method suitable for polymerizing monomers



with low water solubility by complexing them cyclodextrins. There is no mention of urethane thickeners in Lau '266, and no hint or suggestion that the methyl- $\alpha$ -cyclodextrin is suitable for suppressing the viscosity of urethane thickeners. At best, Lau '266 serves as a disclosure for the existence of methyl- $\alpha$ -cyclodextrin.

Moreover, it would not have been obvious to substitute methyl- $\beta$ -cyclodextrin with methyl- $\alpha$ -cyclodextrin. Although they are both composed of  $\alpha$ -D-glucopyranoside units, they are quite different in their physical structures. Methyl- $\alpha$ -cyclodextrin is composed of six glucopyranoside units arranged in a ring, while methyl- $\beta$ -cyclodextrin is composed of seven glucopyranoside units arranged in a ring. As such, the size of the hydrophobic cavities inside the toroidal physical structures of the molecules are quite different, with the diameter of the methyl- $\beta$ -cyclodextrin cavity being necessarily larger than the diameter of the methyl- $\alpha$ -cyclodextrin cavity. Also, their physical properties are markedly different. For example, methyl- $\beta$ -cyclodextrin has a water solubility of only 18.5 g/L, while methyl- $\alpha$ -cyclodextrin has a water solubility of 145 g/L (<http://en.wikipedia.org/wiki/Cyclodextrin>). Since the viscosity suppression effect of these cyclodextrins depends upon the hydrophobe moiety of the urethane thickener filling the hydrophobic cavity, there can be no expectation *a priori* that methyl- $\beta$ -cyclodextrin and methyl- $\alpha$ -cyclodextrin, with different size hydrophobic cavities and widely divergent water solubilities, will both have hydrophobic cavities of suitable sizes to complex the terminal phobes of the urethane thickeners, and therefore be effective in viscosity suppression of polyurethane thickeners.

In response, the Examiner states, "[t]his is not found persuasive because as noted previously, Eisenhart teaches the use of unmodified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins, as well as generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins for viscosity suppression" (Office Action of 8/18/09, p. 6, last par.). Again, as discussed above, Eisenhart does *not* teach generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins for viscosity suppression. Instead, Eisenhart specifically teaches modified cyclodextrins that are more water-soluble than the corresponding unmodified compounds. In particular, Eisenhart teaches hydroxyethyl- and hydroxypropyl-modified cyclodextrins, without specifying whether they are the  $\alpha$ -,  $\beta$ - or  $\gamma$ - forms (col. 3, ll. 50-63).

Accordingly, a person of ordinary skill in the art would not have been motivated to combine the cited references so as to result in the compositions of claims 29 and 30. In the absence of art that provides motivation to combine the two limitations into a single invention, there is no *prima facie* case of obviousness.

2. Appellant has provided evidence of unexpected results sufficient to rebut *prima facie* obviousness.

In the absence of *prima facie* obviousness, an applicant is not required to provide evidence of secondary considerations, such as unexpected results. Appellant has, however, provided such evidence in the experimental results provided in the present application and further discussed in Appellant's Amendment dated August 18, 2009. These studies unequivocally demonstrated that compositions of the present invention that comprise methyl- $\alpha$ -cyclodextrin, as recited in claim 1, exhibit unexpected beneficial properties, which are sufficient to rebut a *prima facie* case of obviousness.

Appellant has found that methyl- $\alpha$ -cyclodextrin is not only effective in the viscosity suppression of urethane thickeners, despite the smaller size of its hydrophobic cavity, but the viscosity suppression of methyl- $\alpha$ -cyclodextrin is even greater than that of methyl- $\beta$ -cyclodextrin when the urethane thickener is derived from HDI. Reference is made to Examples 15-18 (pp. 12-13), the results of which are summarized in Table 4 on p. 13 and reproduced below.

TABLE 4

METHYL- $\beta$ -CD WT%	THICKENER VISCOSITY (cps)		METHYL- $\alpha$ -CD WT%	THICKENER VISCOSITY (cps)	
	HEUR 10 w/ DES W at 20% Solids (Ex 15)	HEUR11 w/ HDI at 20% Solids (Ex 16)		HEUR10 w/ DES W at 20% Solids (Ex 17)	HEUR11 w/ HDI at 20% Solids (Ex 18)
1		14300	1		14100
2	17800	5400	2		3350
3	8350	2550	3	13300	1600
4	2500		4	2750	

At concentrations of 1, 2, and 3 wt%, lower viscosity is obtained with the HDI-based urethane thickener in the presence of methyl- $\alpha$ -cyclodextrin than in the presence of methyl- $\beta$ -cyclodextrin. This viscosity is 38% lower at 2 wt% and 37% lower at 3 wt%. It is highly unlikely that the large differences of 38% and 37% at 2 and 3 wt% are due to random variation.

For all of the reasons set forth above, Appellants believe that The Examiner erred in maintaining the rejection of claim 1 under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart in view of Emmons and in further view of Lau '709 and Lau '266.

- C. The rejection of claims 1, 29, and 30 on the ground of non-statutory obviousness-type double patenting is improper.
- 1. Claim 29 is patentable over Claim 4 of Harris et al., U.S. Patent No. 7,125,919, in view of Emmons.

Claim 29 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of Harris *et al.*, U.S. Patent No. 7,125,919 ("Harris") in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other.

The relevant claims of Harris are reproduced below:

- 1. A tinting composition comprising:
  - a) at least one colorant composition; and
  - b) from 0.05 to 15 % dry weight of at least one additive based on the weight of said at least one colorant composition, wherein said additive comprises at least one highly shear thinning associative thickener, at least one moderately shear thinning associative thickener, and at least one macromolecular organic compound having a hydrophobic cavity.
- 4. The tinting composition according to claim 1, wherein said highly shear thinning associative thickener comprises a hydrophobically modified alkali soluble polymer, and wherein said moderately shear thinning associative thickener comprises a nonionic hydrophobically modified ethylene oxide urethane block copolymer.

Harris generally discloses a tinting composition containing at least one colorant and 0.05 to 15% dry weight of at least one additive selected from associative thickeners and

macromolecular compounds having a hydrophobic cavity (col. 2, ll. 38-43). Examples of associative thickeners include nonionic hydrophobically modified ethylene oxide urethane block copolymers (col. 4, ll. 40-45). Examples of macromolecular compounds having a hydrophobic cavity are cyclodextrins. Cyclodextrin derivatives are  $\alpha$ -,  $\beta$ -, and  $\gamma$ -cyclodextrins in which at least one hydroxyl group located on the rim of the cyclodextrin ring has been functionalized with a substituent group such as methyl, acetyl, hydroxypropyl, and hydroxyethyl groups (col. 6, ll. 4-24). Methyl- $\beta$ -cyclodextrin is the preferred cyclodextrin (col. 6, ll. 23-24).

Emmons is discussed above. The Examiner concedes that the “claims [of Harris] do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.” The Examiner alleges, however that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to prepare the recited composition with cyclodextrins because they are disclosed in the written description of “macromolecular organic compound having a hydrophobic cavity.” It would be further obvious to select any hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of tinting compositions, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

(Office Action of August 18, 2009, p. 7, fourth par.) The Appellant disagrees. The discussion of the patentability of claim 29 over Eisenhart in view of Emmons in the preceding section of this paper applies to the double patenting rejection of claim 29 as well. There is no suggestion in Harris that the urethane thickeners disclosed therein have “at least one urethane linkage formed from a diisocyanate comprising 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, and a combination comprising at least one of the foregoing diisocyanates” as recited by claim 29. There is no motivation to select these particular diisocyanate precursors from the disclosure of Emmons to arrive at claim 29. Moreover, Applicants have clearly demonstrated that surprising and unexpected results are obtained when the associative thickeners are derived from straight chain and branched chain diisocyanates as opposed to cyclic or polycyclic diisocyanates. Accordingly, Appellant believes that the nonstatutory obviousness-type double patenting rejection of claim 29 is improper.

2. Claim 29 is patentable over Claim 3 of Tanzer et al., U.S. Patent No. 6,887,928 in view of Emmons.

Claim 29 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 3 of Tanzer *et al.*, U.S. Patent No. 6,887,928 (“Tanzer”) in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. The Appellant disagrees.

The relevant claims of Tanzer are reproduced below:

1. A method of improving the viscosity stability of a coating composition upon the addition of a colorant component, comprising the steps of:
  - a) providing a base paint; and
  - b) adding to said base paint, a tinting composition comprising:
    - i) at least one colorant composition; and
    - ii) from 0.05 to 15% dry weight of at least one macromolecular compound having a hydrophobic cavity, based on the weight of said at least one colorant composition.
3. The method according to claim 1 or 2 wherein said base paint comprises at least one associative thickener selected from the group consisting of nonionic hydrophobically modified ethylene oxide urethane block copolymer, hydrophobically modified alkali soluble polymer, hydrophobically modified cellulosic, hydrophobically modified polyacrylamide, and mixtures thereof.

Tanzer generally discloses a tinting composition containing at least one colorant and 0.05 to 15% dry weight of at least one additive selected from associative thickeners and macromolecular compounds having a hydrophobic cavity (col. 2, ll. 36-41). Examples of associative thickeners include nonionic hydrophobically modified ethylene oxide urethane block copolymers (col. 4, ll. 17-21). Examples of macromolecular compounds having a hydrophobic cavity are cyclodextrins. Cyclodextrin derivatives are  $\alpha$ -,  $\beta$ -, and  $\gamma$ -cyclodextrins in which at least one hydroxyl group located on the rim of the cyclodextrin ring has been functionalized with a substituent group such as methyl, acetyl, hydroxypropyl, and hydroxyethyl groups (col. 4, ll. 32-53). Methyl- $\beta$ -cyclodextrin is the preferred cyclodextrin (col. 4, ll. 52-53).

Emmons is discussed above. The Examiner concedes that the “claims [of Tanzer] do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.” The Examiner alleges, however, that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to prepare the recited composition with cyclodextrins because they are disclosed in the written description of "macromolecular organic compound having a hydrophobic cavity." It would be further obvious to select any hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of tinting compositions, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

(Office Action of 8/18/09, p. 8, fourth par.)

This rejection is essentially the same as the double patenting rejection over Harris in view of Emmons, discussed above. There is no suggestion in Tanzer to use a urethane thickener with at least one urethane linkage formed from a diisocyanate comprising 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, or a combination comprising at least one of the foregoing diisocyanates, as recited by claim 29. There is no motivation to select these particular diisocyanate precursors from the disclosure of Emmons to arrive at claim 29. Moreover, Applicants have clearly demonstrated that surprising and unexpected results are obtained when the associative thickeners are derived from straight chain and branched chain diisocyanates as opposed to cyclic or polycyclic diisocyanates. For these and other reasons set forth above, Appellants disagree and submit that this ground for rejection is improper.

3. Claim 29 is patentable over Claim 1 of Lau '709 in view of Emmons.

Claim 29 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of Lau '709 in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. The Appellant disagrees.

Claim 1 of Lau '709 is as follows:

1. A method for eliminating the need for organic solvents by hydrophobic thickeners useful for thickening aqueous systems containing a water-insoluble polymer, comprising:
  - a) admixing methyl- $\beta$ -cyclodextrin having hydrophobic groups with a hydrophobic thickener selected from the group consisting of hydrophobically modified polyethyloxyated urethanes, hydrophobically modified alkali soluble emulsions, hydrophobically

- modified cellulose, and hydrophobically modified polyacrylamides, where said methyl- $\beta$ -cyclodextrin is admixed in an amount effective to complex the hydrophobic groups of said methyl- $\beta$ -cyclodextrin with the hydrophobic groups of said hydrophobic thickener;
- b) adding said complexed admixture to said aqueous system containing a water-insoluble polymer; and
  - c) adding to said aqueous system containing said complexed admixture and said water-insoluble polymer, a surfactant selected from the group consisting of an anionic, nonionic and cationic surfactant, where said surfactant is added in an amount effective to decomplex the hydrophobic groups of said methyl- $\beta$ -cyclodextrin from the hydrophobic groups of said hydrophobic thickener.

Lau '709 and Emmons are discussed above. The Examiner characterizes the claims of Lau as being "drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of methyl- $\beta$ -cyclodextrin," and concedes that "[t]he claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers." The Examiner alleges, however that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for elimination of organic solvent using a thickener known to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

(Office Action of 8/18/09, p. 9, fourth par.) The Appellant disagrees. The foregoing discussions on the patentability of claim 29 over Harris in view of Emmons, and over Tanzer in view of Emmons apply equally to this rejection. For the reasons as set forth above for the double patenting rejection over Harris in view of Emmons, Appellants submit that this ground for rejection is improper.

4. Claim 29 is patentable over Claim 2 of Eisenhart in view of Emmons.

Claim 29 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 2 of Eisenhart in view of Emmons.

The relevant claims of Eisenhart are reproduced below:

1. A method for eliminating the need for organic solvents by hydrophobic thickeners useful for thickening aqueous systems containing a water-insoluble polymer, comprising:
  - a) admixing a cyclodextrin-containing compound having hydrophobic groups with a hydrophobic thickener selected from the group consisting of hydrophobically modified polyethoxylated urethanes, hydrophobically modified alkali soluble emulsions, hydrophobically modified cellulose, and hydrophobically modified polyacrylamides where said cyclodextrin-containing compound is admixed in an amount effective to complex the hydrophobic groups of said cyclodextrin-containing compound with the hydrophobic groups of said hydrophobic thickener;
  - b) adding said complexed admixture to said aqueous system containing a water-insoluble polymer; and
  - c) adding to said aqueous system containing said complexed admixture and said water-insoluble polymer, a compound having an affinity for the cyclodextrin-containing compound wherein said compound is an anionic, nonionic and cationic surfactant and where said compound is added in an amount effective to decomplex the hydrophobic groups of said cyclodextrin-containing compound from the hydrophobic groups of said hydrophobic thickener.

2. The method of claim 1 wherein said cyclodextrin-containing compound is selected from the group consisting of alpha, beta and gamma cyclodextrin and ethoxylated and propoxylated cyclodextrins.

All of the cited references are discussed above. The Examiner characterizes the claims of Eisenhart as being “drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of a cyclodextrin,” and concedes that “[t]he claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.” The Examiner alleges however, that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for elimination of organic solvent using a thickener known to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

The Appellant disagrees. This ground for rejection is identical to the grounds for the rejection of these claims as obvious under § 103, and the rejections are addressed by the



Appellant in the preceding section. Therefore, the Appellant submits that this ground for rejection is improper.

5. Claim 1 is patentable over Claim 2 of Eisenhart in view of Emmons, and further in view of Lau '709 and Lau '266.

Claim 1 is rejected over Claim 2 of Eisenhart in view of Emmons, and further in view of Lau '709 and Lau '266.

This rejection is similar to the rejection of claim 29 over claim 2 of Eisenhart. With respect to claim 1, the Examiner alleges that:

Lau '709 and Lau '266 teach as set forth above. The claims recite the use of unmodified  $\alpha$ -,  $\beta$ -, and  $\lambda$ -cyclodextrins, as well as modified  $\alpha$ -,  $\beta$ -, and  $\lambda$ -cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl- $\beta$ -cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available modified cyclodextrin, such as methyl- $\alpha$ -cyclodextrin, disclosed by Lau, '266, with a reasonable expectation of success.

The Appellant disagrees. This ground for rejection is identical to the grounds for the rejection of these claims as obvious under § 103, and the rejections are addressed by the Appellant in the preceding section. Therefore, the Appellant submits that this ground for rejection is improper.

For at least the foregoing reasons, Appellant respectfully submits that the Examiner erred in maintaining the rejections of claims 1, 29, and 30.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 18-1850.

Respectfully submitted,

By: /Leah M. Reimer  
Leah M. Reimer, Ph.D.  
Reg. No. 39, 341

Date: April 19, 2010

## VIII. CLAIMS APPENDIX

1. (Previously Presented) A composition for a reduced viscosity hydrophobic thickener system for thickening a polymer-containing aqueous system, said composition comprising:

a) methyl- $\alpha$ -cyclodextrin having a hydrophobic cavity; and

b) a hydrophobically modified polyethoxylated urethane thickener comprising at least one terminal phobe of a size capable of complexing with said hydrophobic cavity of said cyclodextrin-containing compound and at least one urethane linkage formed from a diisocyanate comprising 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, 1,4-cyclohexylene diisocyanate, 1-isocyanato-3-isocyanatomethyl-3,5,5-trimethylcyclohexane, 2,6- and 2,4-tolylene diisocyanate, m-phenylene diisocyanate, p-phenylene diisocyanate, xylene diisocyanate, 4-chloro-1,3-phenylene diisocyanate, 4,4'-biphenylene diisocyanate, 4,4'-methylene diphenylisocyanate, 1,5-naphthylene diisocyanate, 1,5-tetrahydronaphthylene diisocyanate, and a combination comprising at least one of the foregoing diisocyanates;

wherein at least a portion of said methyl- $\alpha$ -cyclodextrin is complexed with said hydrophobically modified thickener in such a way that at least a portion of at least one of said phobes at least partially fills said hydrophobic cavity.

29. (Previously Presented) A composition for a reduced viscosity hydrophobic thickener system for thickening a polymer-containing aqueous system, said composition comprising:

a) a cyclodextrin-containing compound having a hydrophobic cavity of a predetermined size; and

b) a hydrophobically modified polyethoxylated urethane thickener comprising at least one terminal phobe of a size capable of complexing with said hydrophobic cavity of said cyclodextrin-containing compound and at least one urethane linkage formed from a diisocyanate comprising 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, and a combination comprising at least one of the foregoing diisocyanates;

wherein at least a portion of said cyclodextrin-containing compound is complexed with said hydrophobically modified thickener in such a way that at least a portion of at least one of said phobes at least partially fills said hydrophobic cavity.

30. (Previously Presented) The composition of claim 29, wherein the diisocyanate is 1,6-hexamethylene diisocyanate.

**IX. EVIDENCE APPENDIX**

There is no evidence submitted pursuant to 37 C.F.R. §1.130, 37 C.F.R. §1.131, or 37 C.F.R. §1.132 or any other evidence entered by the Examiner and relied upon by the Appellant in this appeal, known to the Appellants, Appellants' legal representatives, or assignee.

**[NONE]**

**X. RELATED PROCEEDING APPENDIX**

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**[NONE]**